

IN THE CLAIMS

This listing of claims will replace all prior versions, and listings, of claims in the application:

1. (Currently Amended) A digital image system capable of receiving digital image data representing at least part of a digital image and mapping said digital image data onto the range of an output device, said digital image system comprising:

an image statistics processor capable of calculating at least one current image statistic based on said digital image data;

calculation logic connected to receive said at least one current image statistic from said image statistics processor and further being capable of calculating at least one tone curve parameter based on said at least one current image statistic and at least one perceptual preference ~~associated with said digital image system, said perceptual preference specified with respect to said output device in order to obtain from said output device a visually perceptible behavior that corresponds to said perceptual preference~~ ; and

a tone curve generator connected to receive said at least one tone curve parameter from said calculation logic and further being capable of generating a tone curve using said at least one tone curve parameter and a sigmoidal function, said tone curve being used to map said digital image data onto the range of said output device.

2. (Original) The system of Claim 1, further comprising:

a linear transformation device connected to receive said digital image data, convert said digital image data into linear image data and transmit said linear image data to said image statistics processor, said image statistics processor using said linear image data in calculating said at least one current image statistic.

3. (Original) The system of Claim 2, wherein said image statistics processor comprises:

a histogram generator connected to receive said linear image data and generate a histogram of the pixel values represented by said linear image data, said histogram containing a plurality of bins representing respective ranges of pixel values and a count of the number of pixel values represented by said linear image data within each of said plurality of bins;

a converter capable of converting a bin center value for each of said bins associated with said histogram from a linear scale to an L^* scale to produce a plurality of L^* bin center values; and

statistics calculation logic connected to receive said count from said histogram generator and said plurality of L^* bin center values from said converter and calculate said at least one current image statistic using said count and said plurality of L^* bin center values.

4. (Original) The system of Claim 3, further comprising:

a memory for storing said plurality of L^* bin center values prior to said histogram being generated, said statistics calculation logic retrieving said plurality of L^* bin center values in response to receiving said count.

5. (Original) The system of Claim 1, wherein said at least one tone curve parameter includes a slope parameter and a shift parameter and wherein said at least one current image statistic includes a current L^* standard deviation and one of a current mean L^* value or low and high L^* percentile values.

6. (Original) The system of Claim 5, wherein said at least one perceptual preference includes a desired L^* standard deviation and one of a desired mean L^* value or a centering

function, said slope parameter being calculated using said current L^* standard deviation and said desired L^* standard deviation, said shift parameter being calculated using either said current mean L^* value and said desired mean L^* value or said low and high L^* percentile values and said centering function.

7. (Original) The system of Claim 6, further comprising:

an upper pre-selected mean L^* value and an associated upper pre-selected shift value, said shift parameter being set to said upper pre-selected shift value when said current mean L^* value is less than said upper pre-selected mean L^* value and said calculated shift parameter is less than said upper pre-selected shift value: and

a lower pre-selected mean L^* value and an associated lower pre-selected shift value, said shift parameter being set to said lower pre-selected shift value when said current mean L^* value is greater than said lower pre-selected mean L^* value and said calculated shift parameter is greater than said lower pre-selected shift value.

8. (Original) The system of Claim 5, further comprising a memory for storing first and second pre-calculated tone curves generated by said tone curve generator prior to said digital image system receiving said digital image data, said first pre-calculated tone curve having a minimum slope and said second pre-calculated tone curve having a maximum slope.

9. (Original) The system of Claim 8, wherein said tone curve generator comprises: calculation logic connected to receive said slope parameter and said first and second pre-calculated tone curves, said calculation logic being further capable of interpolating between said first and second pre-calculated tone curves using said slope parameter to obtain an initial tone curve; and

shifting logic connected to receive said initial tone curve and said shift parameter, said shifting logic further capable of shifting said initial tone curve on the X-axis using said shift parameter to produce said tone curve used in mapping said digital image data onto the range of said output device.

10. (Original) The system of Claim 1, wherein said tone curve generator further comprises:

gamma correction logic for applying gamma correction to the Y-axis of said tone curve; and

a converter for converting the X-axis of said tone curve to the scale of said digital image data.

11. (Currently Amended) A method for mapping digital image data representing at least part of a digital image onto the range of an output device, said method comprising:

receiving said digital image data at a digital image system;

calculating at least one current image statistic based on said digital image data;

calculating at least one tone curve parameter based on said at least one current image statistic and at least one perceptual preference, said perceptual preference specified with respect to said output device in order to obtain from said output device a visually perceptible behavior that corresponds to said perceptual preference; and

generating a tone curve using said at least one tone curve parameter and a sigmoidal function, and using said tone curve to map said digital image data onto the range of said output device.

12. (Original) The method of Claim 11, wherein said step of calculating said at least one current image statistic further comprises:

converting said digital image data into linear image data; and

calculating said at least one current image statistic using said linear image data.

13. (Original) The method of Claim 12, wherein calculating said at least one current image statistic further comprises:

generating a histogram of the pixel values represented by said linear image data, said histogram containing a plurality of bins representing respective ranges of pixel values and a count of the number of pixel values represented by said linear image data within each of said plurality of bins;

converting a bin center value for each of said bins associated with said histogram from a linear scale to an L^* scale to produce a plurality of L^* bin center values; and

calculating said at least one current image statistic using said count and said plurality of L^* bin center values.

14. (Original) The method of Claim 13, wherein converting said bin centers further comprises:

converting said bin center values to produce a plurality to produce a plurality of L^* bin center values prior to said step of generating; and

storing said plurality of L^* bin center values within a memory.

15. (Original) The method of Claim 11, wherein said at least one tone curve parameter includes a slope parameter and a shift parameter and wherein said at least one

current image statistic includes a current L^* standard deviation and one of a current mean L^* value or low and high L^* percentile values.

16. (Original) The method of Claim 15, wherein said at least one perceptual preference includes a desired L^* standard deviation and one of a desired mean L^* value or a centering function, calculating said at least one tone curve parameter further comprising:

calculating said slope parameter using said current L^* standard deviation and said desired L^* standard deviation; and

calculating said shift parameter using either said current mean L^* value and said desired mean L^* value or said low and high L^* percentile values and said centering function.

17. (Original) The method of Claim 16, wherein calculating said at least one tone curve parameter further comprises:

setting said shift parameter to be equal to an upper pre-selected shift value when said current mean L^* value is less than an upper pre-selected mean L^* value associated with said upper pre-selected shift value and said calculated shift parameter is less than said upper pre-selected shift value; and

setting said shift parameter to be equal to a lower pre-selected shift value when said current mean L^* value is greater than a lower pre-selected mean L^* value associated with said lower pre-selected shift value and said calculated shift parameter is greater than said lower pre-selected shift value.

18. (Original) The method of Claim 15, wherein generating further comprises:

generating first and second pre-calculated tone curves prior to said step of receiving said digital image data, said first pre-calculated tone curve having a minimum slope and said second pre-calculated tone curve having a maximum slope.

19. (Original) The method of Claim 18, wherein generating said tone curve used in mapping said digital image data onto the range of said output device comprises:

interpolating between said first and second pre-calculated tone curves using said slope parameter to obtain an initial tone curve: and

shifting said initial tone curve on the X-axis using said shift parameter to produce said tone curve used in mapping said digital image data onto the range of said output device.

20. (Original) The method of Claim 11, wherein generating said tone curve comprises:

applying gamma correction to the Y-axis of said tone curve; and

converting the X-axis of said tone curve to the scale of said digital image data.